

CLAIMS:

1. An optical sensor system for a hardcopy device, comprising:  
a housing defining an outgoing light path and an incoming light path;  
plural light emitting elements sharing the outgoing light path to illuminate an object within the hardcopy device; and  
a sensor which receives light reflected from the illuminated object through the incoming light path.
2. An optical sensor system according to claim 1 wherein the plural light emitting elements comprise three elements each emitting different colors.
3. An optical sensor system according to claim 2 wherein:  
a first of the three light emitting elements emits a blue light;  
a second of the three light emitting elements emits a green light; and  
a third of the three light emitting elements emits a red light.
4. An optical sensor system according to claim 3 wherein:  
the first of the three light emitting elements emits a blue light having a wavelength with a centroid of 454-484 nanometers;  
the second of the three light emitting elements emits a green light having a wavelength with a centroid of 515-545 nanometers; and  
the third of the three light emitting elements emits a red light having a wavelength with a centroid of 630-660 nanometers.
5. An optical sensor system according to claim 4 wherein:  
the first of the three light emitting elements emits a blue light having a wavelength with a centroid of 459-479 nanometers;  
the second of the three light emitting elements emits a green light having a wavelength with a centroid of 520-540 nanometers; and

the third of the three light emitting elements emits a red light having a wavelength with a centroid of 635-655 nanometers.

6. An optical sensor system according to claim 5 wherein:

the first of the three light emitting elements emits a blue light having a wavelength with a centroid of 469 nanometers;

the second of the three light emitting elements emits a green light having a wavelength with a centroid of 530 nanometers; and

the third of the three light emitting elements emits a red light having a wavelength with a centroid of 645 nanometers.

7. An optical sensor system according to claim 2 further including a fourth light emitting element which emits an orange light.

8. An optical sensor system according to claim 7 wherein the fourth light emitting element emits an orange light having a wavelength with a centroid of 592-622 nanometers.

9. An optical sensor system according to claim 7 wherein the fourth light emitting element emits an orange light having a wavelength with a centroid of 597-617 nanometers.

10. An optical sensor system according to claim 1 wherein the plural light emitting elements each comprises a light emitting diode.

11. An optical sensor system according to claim 10 further including a circuit board with each light emitting element being directly mounted thereto.

12. An optical sensor system according to claim 11 wherein the sensor is also directly mounted to the circuit board.

13. An optical sensor system according to claim 12 wherein the sensor receives diffuse light reflected from the illuminated object.

14. An optical sensor system according to claim 13 wherein:  
the housing defines a second incoming light path; and  
the optical sensor system further includes a second sensor which receives specular light reflected from the illuminated object.
15. An optical sensor system according to claim 1 further including an ambient light shield coupled to the housing and defining a light exit and entrance chamber between the outgoing and incoming light paths and the illuminated object.
16. An optical sensor system according to claim 15 further including a lens assembly between the outgoing and incoming light paths and the light exit and entrance chamber.
17. An optical sensor system according to claim 16 further including a filter element between the incoming light path and the lens assembly.
18. An optical sensor system according to claim 15 further including:  
a lens assembly between the  
outgoing and incoming light paths and the illuminated object; and  
a contaminant shield between the lens assembly and the illuminated object.
19. An optical sensor system according to claim 18 further including an ambient light shield supported by the housing and replaceably receiving the contaminant shield.
20. A method of monitoring a parameter in a hardcopy device, comprising:  
illuminating an object within the hardcopy device with plural light emitting elements each sharing a common light path;  
receiving light reflected from the illuminated object; and  
interpreting information about said parameter from the received reflected light.

21. A method according to claim 20 wherein:  
said illuminating comprises sequentially emitting three different colors of light; and  
said receiving comprises sequentially receiving said three different colors of light reflected from the illuminated object.
22. A method according to claim 21 wherein said three different colors of light comprise blue, green and red.
23. A method according to claim 21 wherein said illuminating comprises sequentially emitting a fourth color of light different from said three different colors of light.
24. A method according to claim 23 wherein said four different colors of light comprise blue, green, red and orange.
25. A method according to claim 20 wherein:  
said receiving comprises receiving said reflected light with a sensor; and  
the method further includes supporting each of the plural light emitting elements and the sensor on a circuit board.
26. A method according to claim 25 wherein:  
said receiving comprises receiving diffuse reflected light with said sensor, and receiving specular reflected light with a second sensor; and  
said supporting further comprises supporting said sensor and said second sensor on said circuit board.
27. A method according to claim 20 further including shielding ambient light from interfering with said illuminating and said receiving.
28. A method according to claim 20 wherein:  
said receiving comprises receiving said reflected light with a sensor; and  
the method further includes shielding said plural light emitting elements and said sensor from

contaminants with a contaminant shield.

29. A method according to claim 28 wherein following said shielding, the method further includes:

removing the contaminant shield from a structure associated with said plural light emitting elements and said sensor;

thereafter, cleaning the contaminant shield; and

thereafter, reinstalling the contaminant shield in said structure for another period of said shielding.

30. An optical sensor system for a hardcopy device, comprising:

a housing;

a circuit board supported by the housing;

plural light emitting elements supported by the circuit board to illuminate an object within the hardcopy device; and

a sensor also supported by the circuit board to receive light reflected from the illuminated object .

31. An optical sensor system according to claim 30 wherein the housing defines an outgoing light path through which light travels from the plural light emitting elements toward the object.

32. An optical sensor system according to claim 31 wherein the housing defines an incoming light path through which reflected light travels from the object toward the sensor.

33. An optical sensor system according to claim 30 wherein the plural light emitting elements comprise three elements each emitting different colors.

34. An optical sensor system according to claim 33 wherein:

a first of the three light emitting elements emits a blue light;

a second of the three light emitting elements emits a green light; and

a third of the three light emitting elements emits a red light.

35. An optical sensor system according to claim 34 wherein:  
the first of the three light emitting elements emits a blue light having a wavelength with a centroid of 459-479 nanometers;  
the second of the three light emitting elements emits a green light having a wavelength with a centroid of 520-540 nanometers; and  
the third of the three light emitting elements emits a red light having a wavelength with a centroid of 635-655 nanometers.

36. An optical sensor system according to claim 35 further including a fourth light emitting element which emits an orange light.

37. An optical sensor system according to claim 36 wherein the fourth light emitting element emits an orange light having a wavelength with a centroid of 597-617 nanometers.

38. An optical sensor system according to claim 37 wherein the plural light emitting elements each comprises a light emitting diode.

39. An optical sensor system according to claim 30 wherein the sensor receives diffuse light reflected from the illuminated object.

40. An optical sensor system according to claim 39 further including a second sensor which receives specular light reflected from the illuminated object.

41. An optical sensor system according to claim 30 further including an ambient light shield coupled to the housing and defining a chamber through which said reflected light travels toward the sensor.

42. An optical sensor system according to claim 41 wherein light travels from said plural light emitting elements toward the object through the chamber of said ambient light shield.

43. An optical sensor system according to claim 41 further including a lens assembly between the sensor and the chamber of said ambient light shield.

44. An optical sensor system according to claim 43 further including a contaminant shield replaceably received by the ambient light shield.

45. A hardcopy device, comprising:

a frame defining a media interaction zone;

a media handling system for moving media through the media interaction zone;

an interaction head which interacts with media in the interaction zone; and

an optical sensor system, comprising:

(a) a housing defining an outgoing light path and an incoming light path;

(b) plural light emitting elements sharing the outgoing light path to illuminate an object within the hardcopy device; and

(c) a sensor which receives light reflected from the illuminated object through the incoming light path.

46. A hardcopy device according to claim 45 wherein:

the media interaction zone comprises a printzone; and

the interaction head comprises a printhead.

47. A hardcopy device according to claim 46 wherein the printhead comprises an inkjet printhead.

48. A hardcopy device according to claim 45 further including a carriage which reciprocates the interaction head through the interaction zone, with the carriage also supporting the housing to move the optical sensor system through the interaction zone.

49. A hardcopy device according to claim 45 wherein:  
the sensor generates a sensor signal in response to the received reflected light; and  
the hardcopy device further includes a controller which adjusts an operating parameter of the hardcopy device in response to said sensor signal.

50. A hardcopy device according to claim 45 wherein the plural light emitting elements comprise three elements each emitting different colors.

51. A hardcopy device according to claim 50 wherein:  
a first of the three light emitting elements emits a blue light;  
a second of the three light emitting elements emits a green light; and  
a third of the three light emitting elements emits a red light.

52. A hardcopy device according to claim 51 wherein:  
the first of the three light emitting elements emits a blue light having a wavelength with a centroid of 459-479 nanometers;  
the second of the three light emitting elements emits a green light having a wavelength with a centroid of 520-540 nanometers; and  
the third of the three light emitting elements emits a red light having a wavelength with a centroid of 635-655 nanometers.

53. A hardcopy device according to claim 51 further including a fourth light emitting element which emits an orange light.

54. A hardcopy device according to claim 53 wherein:  
the fourth light emitting element emits an orange light having a wavelength with a centroid of 597-617 nanometers; and  
the plural light emitting elements each comprise a light emitting diode.



55. A hardcopy device, comprising:

a frame defining a media interaction zone;

a media handling system for moving media through the media interaction zone;

an interaction head which interacts with media in the interaction zone; and

an optical sensor system, comprising:

(a) a housing;

(b) a circuit board supported by the housing;

(c) plural light emitting elements supported by the circuit board to illuminate an object within the hardcopy device; and

(d) a sensor also supported by the circuit board to receive light reflected from the illuminated object.

56. A hardcopy device according to claim 55 wherein the housing defines an outgoing light path through which light travels from the plural light emitting elements toward the object.

57. A hardcopy device according to claim 56 wherein the housing defines an incoming light path through which reflected light travels from the object toward the sensor.

58. A hardcopy device according to claim 55 wherein the sensor receives diffuse light reflected from the illuminated object.

59. A hardcopy device according to claim 58 further including a second sensor which receives specular light reflected from the illuminated object.

60. A hardcopy device according to claim 55 wherein:

a first of the three light emitting elements emits a blue light;

a second of the three light emitting elements emits a green light; and

a third of the three light emitting elements emits a red light.

61. A hardcopy device according to claim 60 wherein:
- the first of the three light emitting elements emits a blue light having a wavelength with a centroid of 459-479 nanometers;
  - the second of the three light emitting elements emits a green light having a wavelength with a centroid of 520-540 nanometers; and
  - the third of the three light emitting elements emits a red light having a wavelength with a centroid of 635-655 nanometers.
62. A hardcopy device according to claim 61 further including a fourth light emitting element which emits an orange light.
63. A hardcopy device according to claim 62 wherein the fourth light emitting element emits an orange light having a wavelength with a centroid of 597-617 nanometers.
64. A hardcopy device according to claim 55 wherein the plural light emitting elements each comprises a light emitting diode.